EAVES TROUGH SUPPORT BRACKET

FIELD OF THE INVENTION

The present invention relates to eaves trough support brackets.

BACKGROUND

Eaves troughs are commonly supported in position along the eaves of a building with eaves trough support brackets. A wide variety of eaves trough support brackets have been devised including those disclosed in United States Patents 5,687,936 issued to Wilson, 5,570,860, issued to Schoenherr, 4,210,301, issued to Weiss, 3,737,127, issued to Maloney, Jr. et al., 3,426,987, issued to Leslie and 3,416,760, issued to Sauder 4,210,301, issued to Weiss.

United States Patent No. 3,426,987 discloses a two-piece eaves trough bracket, which allows the longitudinal length of the bracket to be adjusted in order to accommodate eaves troughs of different widths. While generally effective for supporting an eaves trough, such brackets are relatively expensive due to the two-part construction, and provide limited vertical support to the distal edge of the eaves trough.

United States Patents Nos. 3,416,760 and 4,210,301 disclose single piece eaves trough brackets which can be quickly and inexpensively manufactured by stamping a blank from sheet metal and bending the blank to the desired shape. While significantly less expensive than the two-piece bracket of United States Patent No. 3,426,987, these brackets continue to provide limited vertical support to the distal edge of the eaves trough.

United States Patent No. 3,737,127 discloses connection of a strap member to the longitudinal center of an eaves trough bracket and the roof in order to improve the vertical support provided by the bracket. While effective for improving the vertical support provided by the bracket, the strap significantly increases cost and complicates installation.

United States Patent No. 5,570,860 discloses an eaves trough bracket having a main longitudinal support member, an arched transverse leg extending downward from directly below the proximal end of the main member and a diagonal brace extending from the distal end of the

leg to the distal end of the main support member. While effective for improving the vertical support provided by the bracket, the bracket is relatively expensive as the configuration of the bracket prevents the bracket from being quickly and inexpensively stamped from sheet metal and bent to the desired shape.

Accordingly, a need exists for an inexpensive eaves trough support bracket, which is simple and easy to install, and capable of providing improved vertical support to the distal end of the eaves trough.

SUMMARY OF THE INVENTION

The invention is an inexpensive eaves trough support bracket, which is simple and easy to install, and capable of providing improved vertical support to the distal end of the eaves trough.

The eaves trough support bracket includes (a) a main beam having longitudinally spaced distal and proximal ends, laterally spaced first and second edges, and transversely spaced first and second surfaces, (b) a connection element extending in a first transverse direction from the distal end of the main beam, (c) a hook extending in the first transverse direction and a second longitudinal direction from the proximal end of the main beam, and defining a concavity open in a second transverse direction, (d) a first leg extending in a second transverse direction from the first edge of the main beam with a proximal longitudinal end substantially transversely aligned with the proximal end of the main beam, and (e) a second leg extending in the second transverse direction from the second edge of the main beam with a proximal longitudinal end substantially transversely aligned with the proximal end of the main beam.

The eaves trough support bracket is effective for supporting a length of eaves trough from an eave and can conveniently be provided as a "ready-to-install" combination of a length of eaves trough and a plurality of the eaves trough support brackets.

Eaves trough can be quickly and efficiently installed using the eaves trough support brackets by (i) obtaining a length of eaves trough having a bottom, a back wall, a front wall and a snap-lock channel formed along the distal edge of the front wall, (ii) obtaining a plurality of the eaves trough support brackets, (iii) engaging the connection element of the support bracket within the snap-lock channel formed in the eaves trough, (iv) sliding the distal edge of the rear wall of the eaves trough into the concavity defined by the hook to form a connected eaves trough

assembly, (v) positioning the connected eaves trough assembly along an eave with the back wall of the eaves trough engaging the eave, and (vi) securing the connected eaves trough assembly to the eave by longitudinally driving a mechanical fastener through the hook of the bracket and the rear wall of the eaves trough, and into connective engagement with the eave

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a front perspective view of a first embodiment of the invention.

Figure 2 is a right side view of the invention shown in Figure 1.

Figure 3 is a left side view of the invention shown in Figure 1.

Figure 4 is a front view of the invention shown in Figure 1.

Figure 5 is a side view of the invention shown in Figure 1 positioned within a gutter.

DETAILED DESCRIPTION OF THE INVENTION INCLUDING A BEST MODE

Nomenclature

Components

10	Bracket
20	Main Beam
21	Proximal End of Main Beam
22	Distal End of Main Beam
23	First Edge of Main Beam
24	Second Edge of Main Beam
25	First Surface of Main Beam
26	Second Surface of Main Beam
30	Connection Element
40	Strut

41	First End of Strut
42	Second End of Strut
50	Tab
51	First End of Tab
52	Second End of Tab
60	Hook
69	Concavity Defined by Hook
70	Shaft Portion of Hook
71	First End of Shaft Portion
72	Second End of Shaft Portion
79	Hole Through Shaft Portion of Hook
80	Hooking Portion of Hook
81	First End of Hooking Portion
82	Second End of Hooking Portion
90	Extension Portion of Hook
91	First End of Extension Portion
92	Second End of Extension Portion
99	Hole Through Extension Portion of Hook
110	First Leg
111	Proximal Longitudinal End of First Leg
112	Distal Longitudinal End of First Leg
120	Second Leg
121	Proximal Longitudinal End of Second Leg
122	Distal Longitudinal End of Second Leg
131	Rib Across First Bend Line
132	Rib Across Second Bend Line
133	Rib Across Third Bend Line
201	First Bend Line
202	Second Bend Line
203	Third Bend Line
204	Fourth Bend Line
204d	Distal End of Fourth Bend Line
204p	Proximal End of Fourth Bend Line
205	Fifth Bend Line
205d	Distal End of Fourth Bend Line
205p	Proximal End of Fourth Bend Line

300	Mechanical Fastener
400	Eaves Trough
409	Water Diversion Channel Defined by Eaves Trough
410	Bottom of Eaves Trough
420	Back Wall of Eaves Trough
422	Distal Edge of Back Wall of Eaves Trough
430	Front Wall of Eaves Trough
432	Distal Edge of Front Wall of Eaves Trough
440	Snap-Lock Channel
500	Eave

Spatial Axes and Directions

x	Longitudinal Axis
x^1	First Longitudinal Direction
x^2	Second Longitudinal Direction
y	Latitudinal Axis
y^1	First Latitudinal Direction
y^2	Second Latitudinal Direction
z	Transverse Axis
z^1	First Transverse Direction
z^2	Second Transverse Direction

Definitions

As utilized herein, including the claims, the term ***"mechanical fasteners,"*** include nails, spikes, brads, staples, and screws.

As utilized herein, including the claims, the phrase "***substantially perpendicular,***" means forming an angle α of between 60° and 120° (*i.e.*, within 30° of perpendicular).

As utilized herein, including the claims, the phrase "***substantially transversely aligned,***" means transversely spaced less than 0.4 inches.

Construction

Referring generally to Figures 1-5, a first aspect of the invention is an eaves trough support bracket **10**, which includes a main beam **20**, a connection element **30**, a hook **60**, a first leg **110** and a second leg **120**.

The main beam **20** extends in a longitudinal direction **x** with a distal end **22** longitudinally spaced in a first longitudinal direction $\mathbf{x}^1$ from a proximal end **21**. The main beam **20** may be sized, shaped and configured as desired so long as the longitudinal length of the main beam **20** is matched with the longitudinal length of the eaves trough **400** to be installed with the bracket **10**, is capable of securely supporting the eaves trough **400** cantilevered from an eave **500**, and capable of withstanding normal wear and tear. Acceptable configurations of the main beam **20** include specifically but not exclusively, a rectangular plane, a lattice framework, a U-shaped beam, etc.

The main beam **20** preferably has (i) a longitudinal length of 5 inches or 6 inches in order to be compatible with commercially available eaves trough **400**, (ii) a lateral width of about 0.5 to 2 inches, most preferably about 1 to 1.5 inches, in order to provide sufficient structural rigidity while limiting cost, and (iii) a transverse thickness of about 0.04 to 0.06 inches, preferably 0.04 to 0.05 inches in order to provide sufficient structural rigidity while limiting cost.

In a preferred embodiment, the main beam **20** defines (i) laterally spaced linear first **23** and second **24** edges, and (ii) a first major surface **25** facing a first transverse direction $\mathbf{z}^1$ and a second major surface **26** facing a second transverse direction $\mathbf{z}^2$.

The connection element **30** extends in both the first transverse direction $\mathbf{z}^1$ and the second longitudinal direction $\mathbf{x}^2$ from the distal end **22** of the main beam **20** for releasable engagement within the snap-lock channel **440** on the distal edge **432** of the front wall **430** of an eaves trough **400**.

A preferred connection element **30** includes a strut **40** and a tab **50**. The strut **40** extends substantially perpendicular in the first transverse direction $\mathbf{z}^1$ from the distal end **22** of the main beam **20**, with a first end **41** of the strut **40** connected to the distal end **22** of the main beam **20** and a second end **42** of the strut **40** transversely spaced from the distal end **22** of the main beam **20** in the first transverse direction $\mathbf{z}^1$. The tab **50** extends substantially perpendicular in the second longitudinal direction $\mathbf{x}^2$ from the second end **42** of the strut **40**, with a first end **51** of the

tab **50** connected to the second end **42** of the strut **40** and a second end **52** of the tab **50** longitudinally spaced from the second end **42** of the strut **40** in the second longitudinal direction x^2.

The connection element **30** may be sized, shaped and configured as desired so long as the connection element **30** extends in both the first transverse direction z^1 and the second longitudinal direction x^2 from the main beam **20**, the connection element **30** is capable of securely supporting an eaves trough **400** cantilevered from an eave **500**, and the connection element **30** is capable of withstanding normal wear and tear.

The connection element **30** preferably (i) extends a transverse distance of about 0.4 to 0.6 inches in the first transverse direction z^1 from the distal end **22** of the main beam **20** and a longitudinal distance of about 0.4 to 0.6 inches in the second longitudinal direction x^2 from the distal end **22** of the main beam **20** in order to be compatible with commercially available eaves trough **400**, (ii) has a lateral width of about 0.5 to 2 inches, most preferably about 1 to 1.5 inches, in order to provide sufficient structural rigidity while limiting cost, and (iii) has a thickness of about 0.04 to 0.06 inches, preferably about 0.04 to 0.05 inches, in order to provide sufficient structural rigidity while limiting cost.

The hook **60** extends in the first transverse direction z^1 and the second longitudinal direction x^2 from the proximal end **21** of the main beam **20**. The hook **60** defines a concavity **69** open in a second transverse direction z^2. The hook **60** is preferably laterally elongated so as to prevent lateral pivoting or rolling of the bracket **10** upon the distal edge **422** of the back wall **420** of the eaves trough **400** during installation or use.

In a preferred embodiment, the hook **60** includes a shaft portion **70**, a hooking portion **80** and an extension portion **90**.

The shaft portion **70** extends substantially perpendicular in the first transverse direction z^1 from the proximal end **21** of the main beam **20**, with a first end **71** of the shaft portion **70** connected to the proximal end **21** of the main beam **20** and a second end **72** of the shaft portion **70** transversely spaced from the proximal end **21** of the main beam **20** in the first transverse direction z^1.

The hooking portion **80** extends in the second longitudinal direction x^2 from the second end **72** of the shaft portion **70**, with a first end **81** of the hooking portion **80** connected to the

second end **72** of the shaft portion **70** and a second end **82** of the hooking portion **80** longitudinally spaced from the second end **72** of the shaft portion **70** in the second longitudinal direction $\mathbf{x^2}$. The second end **82** of the hooking portion **80** is also longitudinally spaced from the proximal end **21** of the main beam **20** in the second longitudinal direction $\mathbf{x^2}$. The hooking portion **80** preferably forms an approximately 180° arch with the apex (unnumbered) of the arch extending in the first transverse direction $\mathbf{z^1}$.

The extension portion **90** of the hook **60** extends in the second transverse direction $\mathbf{z^2}$ from the second end **82** of the hooking portion **80**, with a first end **91** of the extension portion **90** connected to the second end **82** of the hooking portion **80** and a second end **92** of the extension portion **90** transversely spaced from the second end **82** of the hooking portion **80** in the second transverse direction $\mathbf{z^2}$. The extension portion **90** is preferably positioned parallel to the shaft portion **70**.

The hook **60** preferably (i) extends a transverse distance of about 0.8 to 1 inch, preferably about 0.85 to 0.9 inches, in the first transverse direction $\mathbf{z^1}$ from the distal end **22** of the main beam **20**, (ii) has a lateral width of about 0.5 to 2 inches, most preferably about 1 to 1.5 inches, in order to provide sufficient structural rigidity and preventing lateral pivoting or rolling of the bracket **10** upon the distal edge **422** of the back wall **420** of the eaves trough **400** during installation or use while limiting cost, and (iii) has a thickness of about 0.04 to 0.06 inches, preferably about 0.04 to 0.05 inches, in order to provide sufficient structural rigidity while limiting cost.

The concavity **69** defined by the hook **60** preferably has (i) has a longitudinal depth sufficient to allow fitted engagement of the distal edge **422** of the back wall **420** of the eaves trough **400** into the concavity **69**, and (ii) a transverse height of about 0.8 to 1 inch, preferably about 0.8 to 0.9 inches, so that the mechanical fastener **300** used to attach the bracket **10** to an eave **500** will catch the extension portion **90** and thereby increase the structural integrity of the attachment.

A first **110** and a second leg **120** extend in the second transverse direction $\mathbf{z^2}$ from the first edge **23** and the second edge **24** of the main beam **20** respectively.

The first and second legs **110** and **120** each have a proximal longitudinal end **111** and **121**, respectively, which is substantially transversely aligned with the proximal end **21** of the main beam **20**. Such transverse alignment allows the proximal longitudinal ends **111** and **121** of

the first and second legs **110** and **120**, respectively, to rest upon the back wall **420** of the eaves trough **400** and the eave **500** when installed, and thereby increase the structural integrity of the installed eaves trough **400** relative to a force applied in the second transverse direction $\mathbf{z}^2$ anywhere along the longitudinal length of the main beam **20**, including such a force applied to the distal end **22** of the main beam **20** of the bracket **10** resulting from a downward force applied to the bottom **410** and/or front wall **430** of the eaves trough **400**.

The first and second legs **110** and **120** preferably extend in the longitudinal direction at least one-half the longitudinal length, preferably at least three-fourths the longitudinal length, of the main beam **20** along the first and second edges **23** and **24**, respectively. Such longitudinal extension of the legs **110** and **120** increases the structural integrity of the main beam **20** relative to a force applied in a transverse direction $\mathbf{z}^2$ anywhere along the longitudinal length of the main beam **20**.

The first and second legs **110** and **120** may be independently sized, shaped and configured as desired so long as the legs **110** and **120** extend in the second transverse direction $\mathbf{z}^2$ from the main beam **20** with proximal longitudinal ends **111** and **121**, respectively, which are substantially transversely aligned with the proximal end **21** of the main beam **20**.

The legs **110** and **120** are preferably mirror images of one another with a generally triangular shape when viewed in the lateral direction **y**. The legs **110** and **120** preferably (i) extend a transverse distance of about 0.2 to 1.5 inches, preferably 0.5 to 1.5 inches, in the second transverse direction $\mathbf{z}^2$ from the proximal end **21** of the main beam **20**, (ii) extend longitudinally along the edges **23** and **24** of the main beam **20** from the proximal end **21** of the main beam **20** to within about 0.2 inches of the distal end **22** of the main beam **20**, and (iii) have a thickness of about 0.04 to 0.06 inches, preferably about 0.04 to 0.05 inches, in order to provide sufficient structural rigidity while limiting cost.

Ribs **131**, **132**, and 133 are preferably provided (*e.g.*, stamped) across and substantially perpendicular to the first **201**, second **202**, and third **203** bend lines, respectively, in order to improve the longitudinal structural strength of the bracket **10** along the bend lines **201**, **202**, and **203**. The rib **131** across the first bend line **201** preferably extends a distance in the second longitudinal direction $\mathbf{x}^2$ from the distal end **22** of the main beam **20** sufficient to cause the rib **131** to extends beyond the distal longitudinal ends **204d** and **205d** of the fourth and fifth bend lines **204** and **205**, respectively, and thereby provide improved structural integrity of the main

beam **20** relative to a force applied in a transverse direction z^2 along the entire longitudinal length of the main beam **20**.

The bracket **10** preferably includes longitudinally aligned holes **79** and **99** through the shaft portion **70** and the extension portion **90** of the hook **60**, respectively, for accommodating passage of the shaft (unnumbered) of a mechanical fastener **300** throughout the holes **79** and **99** during installation.

The holes **79** and **99** are preferably transversely positioned on the hook **60** that the holes **79** and **99** will be vertically positioned above the distal edge **432** of the front wall **430** of the eaves trough **400** after installation of the eaves trough assembly so that any water (not shown) retained within the water diversion channel **409** defined by the eaves trough **400** will spill over the distal edge **432** of the front wall **430** of the eaves trough **400** before contacting and entering either of the holes **79** and **99** in the hook **60**.

Manufacture

The bracket **10** is preferably integrally formed from a single mass of material as a single unitary article. Materials from which the bracket **10** may be constructed include any material having the necessary structural integrity and weatherability including specifically, but not exclusively: metals, such as aluminum and steel; and plastics, such as poly vinyl chloride and polyurethane. Selection of a suitable material is well within the competency of those having ordinary skill in the art.

The bracket **10** is preferably manufactured from a metal, such as aluminum, by (i) stamping bracket blanks (not shown) from sheet stock (not shown), (ii) punching holes **79** and **99** through the bracket blanks at the appropriate locations, (iii) bending each bracket blank along bends lines **201**, **202**, **203**, **204**, and **205** to form a bracket **10**, and (iv) stamping ribs **131**, **132**, and **133** into the bracket **10**. The entire manufacturing process can be completed on a continuous basis utilizing commercially available converting equipment.

Installation

Eaves trough **400** can be quickly and easily installed along the eaves **500** of a building (unnumbered) utilizing the brackets **10**. After obtaining a length of eaves trough **400** and cutting the eaves trough **400** to the proper lateral length, brackets **10** are fitted onto the eaves trough **400**

at a lateral spacing of about 1 to 3 feet along the lateral length of the eaves trough **400** by (i) engaging the connection element **30** of each support bracket **10** within the snap-lock channel **440** formed in the eaves trough **400**, and (ii) sliding the distal edge **422** of the back wall **420** of the eaves trough **400** into the concavity **69** defined by the hook **60**.

The eaves trough assembly is then lifted into position along an eave **500** with the back wall **420** of the eaves trough **400** engaging the eave **500**, and the eaves trough **400** connectively attached to the eave **500** by longitudinally driving a mechanical fastener **300**, preferably a screw, through the hook **60** and that portion of the rear wall **420** of the eaves trough **400** engaged within the concavity **69** defined by the hook **60**.

When holes **79** and **99** are provided in the hook **60** of each bracket **10**, proper positioning and alignment the mechanical fasteners **300** is ensured and the fastener **300** can be driven through the holes **79** and **99** with minimal resistance.